भारतीय मानक
Indian Standard

IS 1204 : 2022

टार और बिटुमन सामग्रियों के लिए परीक्षण पद्धतियाँ — विनिर्दिष्ट भेदन के अवशिष्ट ज्ञात करना

(दूसरा पुनरीक्षण)

Methods for Testing Tar and Bituminous Materials — Determination of Residue of Specified Penetration

(Second Revision)

ICS 75.140

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Bitumen, Tar and Related Products Sectional Committee, PCD 06

FOREWORD

This Indian Standard (Second Revision) was adopted by the Bureau of Indian Standards after the draft finalized by the Bitumen, Tar and Related Products Sectional Committee, had been approved by the Petroleum, Coal and Related Product Division Council

This standard was originally published in 1958 as 'Methods for testing tar and bituminous materials — Determination of residue of specified penetration and subsequently revised in 1978. 'Methods for testing tar and bituminous materials' was originally published as series of 22 standards in the form of a booklet, as listed below:

IS No.	*Title*
1201 : 2004	Sampling
1202 : 1978	Determination of specific gravity
1203 : 1978	Determination of penetration
1204 : 1978	Determination of residue of specified penetration
1205 : 1978	Determination of softening point
1206 (Part 1) : 1978	Determination of viscosity: Part 1 Industrial viscosity
1206 (Part 2) : 1978	Determination of viscosity: Part 2 Absolute viscosity
1206 (Part 3) : 1978	Determination of viscosity: Part 3 Kinematic viscosity
1207 : 1978	Determination of equiviscous temperature (EVT)
1208 : 1978	Determination of ductility
1209 : 1978	Determination of flash point and fire point
1210 : 1978	Float test
1211 : 1978	Determination of water content dean and stark method
1212 : 1978	Determination of loss on heating
1213 : 1978	Distillation test
1214 : 1978	Determination of matter insoluble in benzene (WITHDRAWN due to toxic nature of benzene)
1215 : 1978	Determination of matter insoluble in toluene
1216 : 1978	Determination of solubility in carbon disulphide trichloroethylene
1217 : 1978	Determination of mineral matter ash
1218 : 1978	Determination of phenols
1219 : 1978	Determination of naphthalene
1220 : 1978	Determination of volatile matter content

However, the Committee responsible for the formulation of standards in the field of bitumen, tar and related products decided to publish these Indian standards separately for each test so as to make it user friendly.

Accordingly, second revision of the standard, was taken up to formulate individual standard on determination of residue of specified penetration .In this revision ,use of Calibrated Digital thermometers with suitable range has been permitted.

The Composition of the Committee responsible for formulation of this standard is given at Annex A.

In reporting the results of a test or analysis made in accordance with this standard, if the final value, observed or calculated, is to be rounded off, it shall be done in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'.

Indian Standard

METHODS FOR TESTING TAR AND BITUMINOUS MATERIALS — DETERMINATION OF RESIDUE OF SPECIFIED PENETRATION

(Second Revision)

1 SCOPE

This standard covers the method for the determination of residue of specified penetration of cutback bitumen.

2 REFERENCES

The following standards contain provisions, which through reference in this text, constitute provisions of this draft standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below:

IS No.	*Title*
334 : 2002	Glossary of terms relating to bitumen and tar (*third revision*)
460 (Part 1) : 2020	Specification for test sieves: Part 1 Wire cloth test sieves (*third revision*)
1203 : 2021	Methods for testing tar and bituminous materials — Determination of penetration

3 TERMINOLOGY

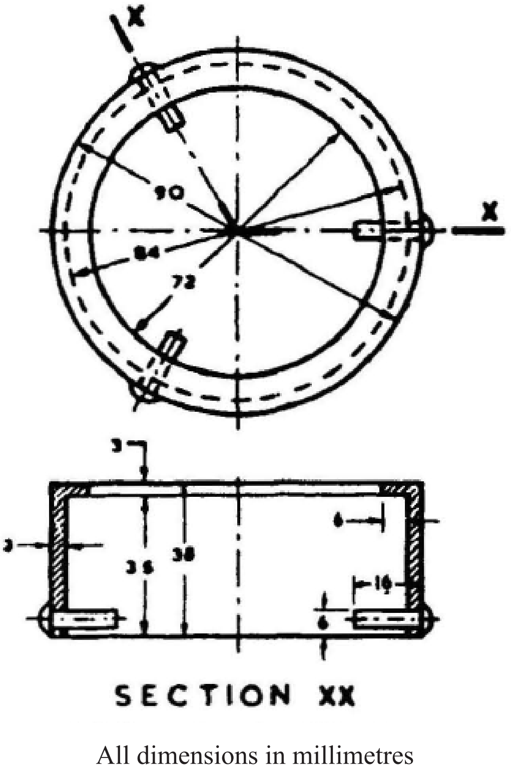
3.1 For the purpose of this standard, the following definition and those given in IS 334 shall apply.

3.2 Residue of Specified Penetration — It is the percentage by mass of a residue obtained by heating a bituminous material to the required temperature and having a specified standard penetration value. Alternatively, the determination of residue of specified penetration is made at two stages, one giving a penetration higher than 100 and the other lower than 100, and the result is obtained by interpolation.

4 APPARATUS

4.1 Container — A flat-bottomed, cylindrical seamless tin dish 70 mm in diameter and 45 mm in depth.

4.2 Heating Bath — A cast iron bath with the shape and dimensions as shown in Fig. 1 permitting the immersion of the container to a depth of 32 mm through an opening 1.6 mm larger in diameter than the container. It shall be provided with three rivets or bolts so as to support the container 6 mm above the hot plate. The free air space between the sides of the container and of the air bath below the opening shall be not less than 6 mm.



All dimensions in millimetres

FIG. 1 HEATING BATH

4.3 Hot Plate — Suitably mounted and heated either electrically or by means of a gas flame, capable of maintaining the sample continuously at the required temperature, provided with an apparatus, such as a rheostat or gas pressure regulator.

4.4 Thermometer — An open flash thermometer having the range from minus 6 °C to plus 400 °C shall conform to the following:

Immersion	25 mm
Temperature range	−6 °C to + 400 °C
Subdivision	2 °C
Longer graduation lines at each	10 °C
Graduation numbered at each	20 °C
multiple of Scale error at any point up to	372 °C 1 °C

when standardized shall not exceed

Calibrated digital thermometers with suitable range can also be used

4.5 Needle — As specified under **5.2** of IS 1203.

4.6 Water Bath — As specified under **5.3** of IS 1203.

4.7 Penetration Apparatus as specified under **5.5** of IS 1203.

5 PROCEDURE

5.1 Preparation of Sample

5.1.1 Thoroughly stir and agitate the material as received to ensure a complete mixture before the portion for testing is removed. If the sample contains extraneous matter, it should be sieved through IS Sieve 30.

5.2 Weigh 100.00 ± 0.10 g sample of the material to be tested into the tared container and place the container in the air bath in position to be heated. Support the thermometer in the sample equidistant from the sides of the container, with the bottom of the bulb neither more than 6 mm above nor touching the bottom of the container. Immerse the bulb completely in the sample and keep it immersed throughout the heating. Heat the sample as rapidly as possible, without foaming, to a temperature of 249 °C and during the evaporation maintain the temperature between 249 °C and 260 °C. Stir the sample from time to time to prevent local overheating and, to maintain a homogeneous sample, flux in the sample all cakes of hardened bitumen which form at the sides of the container.

5.2.1 An experienced operator would be able to judge approximately the consistency of the residue he should obtain to secure the desired penetration when it is judged that the residue might show the required penetration, return to the container the bitumen on the thermometer which may be readily scraped off. Remove the container from the air bath, cool and weigh.

5.3 Determine the penetration of the residue in accordance with **4.2** of IS 1203 with the exception that the container as specified in **4.1** in which the evaporation has been conducted, shall be used.

5.4 Frequently, it is necessary to make several trials before a residue of the required penetration is obtained. If it is found to be of greater value than required, remove all water from the container and the surface of the sample, and repeat the heating and determination of penetration as before. Ordinarily, a residue is considered as satisfactorily obtained when its penetration is 100.

5.4.1 When it is necessary to determine more precisely the percentage of residue having penetration of 100, such as a percentage shall be calculated by interpolation between percentages of two residues, one having a penetration greater and one having a penetration lower than 100.

6 REPORT

Calculate *the* percentage by weight of the original samples and report it as the percentage residue of 100 penetration stating whether the penetration was actually determined for the sample tested or calculated by interpolation.

7 PRECISION

Duplicate determinations by this method shall not differ from each other by more than 1.0 percent with the same operator and not more than 2.5 percent between different laboratories.

8 PRECAUTION

Certain types of cut back bitumens readily form rings of hard bitumen at the side of the container. Care shall be taken that this material is completely fluxed into the sample before the penetration of residue is determined.

ANNEX A

(*Foreword*)

COMMITTEE COMPOSITION

Bitumen,Tar and Related Products Sectional Committee, PCD 06

Organization	*Representative(s)*
CSIR-Central Road Research Institute, New Delhi	Prof Satish Chandra (***Chairman***)
Airports Authority of India, New Delhi	Shri Suprio Gosh Shri Vinod Kumar Sharma (*Alternate*)
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Bharat Petroleum Corporation Limited, Kochi Refinery	Shri Adalazhagan K.
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Indian Institute of Petroleum, Dehradun	Shri Manoj Srivastava Dr Kamal Kumar (*Alternate*)
Indian Institute of Technology Bombay, Mumbai	Dr Dharamveer Singh
Indian Institute of Technology Delhi, New Delhi	Dr Aravind Swamy

Organization	*Representative(s)*
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Member Secretary

Shrimati D. Uma
Scientist 'D' (PCD), BIS

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